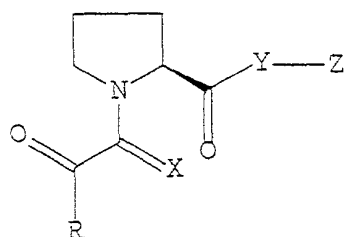


WHAT IS CLAIMED IS:

1. A method of revitalizing hair growth which comprises:
administering to an animal an effective amount of a non-
5 immunosuppressive pyrrolidine carboxylate compound.

2. The method of claim 1 wherein the pyrrolidine
carboxylate is a compound of the formula:



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wherein

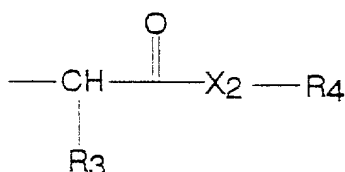
(R) is selected from the group consisting of a C₁-C₈ straight
or branched chain alkyl or alkenyl group optionally
substituted with C₃-C₈ cycloalkyl, C₃ or C₅ cycloalkyl, C₅-C₈
cycloalkenyl, Ar₁, where said alkyl, alkenyl, cycloalkyl or
cycloalkenyl groups may be optionally substituted with C₁-C₄
alkyl, C₁-C₄ alkenyl, or hydroxy, where Ar₁ is selected from
the group consisting of 1-naphthyl, 2-naphthyl, 2-indolyl,
3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-
thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, and phenyl,
having one to three substituents which are independently
selected from the group consisting of hydrogen, halo,
20 hydroxyl, nitro, trifluoromethyl, C¹-C₆ straight or branched
alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy,
benzyloxy, and amino:

X is selected from the group consisting of oxygen, sulphur, methylene (CH_2), or H_2 ;

Y is selected from the group consisting of oxygen or NR_2 , where R_2 is hydrogen or $\text{C}^1\text{-C}_6$ alkyl; and

5 Z is selected from the group consisting of $\text{C}_2\text{-C}_6$ straight or branched chain alkyl or alkenyl,

wherein the alkyl chain is substituted in one or more positions with Ar_1 as defined above, $\text{C}_3\text{-C}_8$ cycloalkyl, cycloalkyl connected by a $\text{C}_1\text{-C}_6$ straight or unbranched alkyl or alkenyl chain, and Ar_2 is selected from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, and phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, $\text{C}_1\text{-C}_6$ straight or branched alkyl or alkenyl, $\text{C}_1\text{-C}_4$ alkoxy or $\text{C}_1\text{-C}_4$ alkenyloxy, phenoxy, benzyloxy, and amino; Z may also be the fragment:



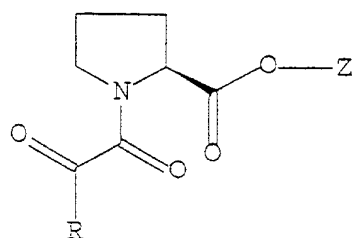
wherein

20 R_3 is a $\text{C}_1\text{-C}_6$ straight or branched alkyl $\text{C}_1\text{-C}_8$ optionally substituted with $\text{C}_3\text{-C}_8$ cycloalkyl, or Ar_1 as defined above, and unsubstituted Ar_1 ;

X_2 is O or NR_5 , where R_5 is selected from the group consisting of hydrogen, $\text{C}_1\text{-C}_6$ straight or branched alkyl and alkenyl;

5 R₄ is selected from the group consisting of phenyl, benzyl, C₁-C₆ straight or branched alkyl or alkenyl, and C₁-C₆ straight or branched alkyl or alkenyl substituted with phenyl; or pharmaceutically acceptable salts or hydrates thereof.

3. The method of claim 1 wherein the pyrrolidine carboxylate is a compound of the formula:



II

wherein

10 R₁ is a C₁-C₆ straight or branched chain alkyl or alkenyl group optionally substituted with C₃-C₆ cycloalkyl, C₃ or C₅ cycloalkyl, C₅-C₆ cycloalkenyl, or Ar₁, where said alkyl, alkenyl, cycloalkyl or cycloalkenyl groups may be optionally substituted with C₁-C₄ alkyl, C₁-C₄ alkenyl, or hydroxy, and where Ar₁ is selected from the group consisting of 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino;

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Z is a C₂-C₆ straight or branched chain alkyl or alkenyl, wherein the alkyl chain is substituted in one or more positions with Ar₁ as defined above, C₁-C₆ cycloalkyl, cycloalkyl connected by a C₁-C₆ straight or unbranched alkyl or alkenyl chain, or Ar₂, where Ar₂ is selected from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino; or pharmaceutically acceptable salts or hydrates thereof.

4. The method of claim 1 wherein the pyrrolidine carboxylate compound is selected from the group consisting of:

3-phenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-prop-2-(E)-enyl (2S)-1-(3,3,-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3,4,5-trimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3,4,5-trimethoxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(4,5-methylenedioxyphenyl)-1-propyl(2S)-1-(3,3,dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(4,5-methylenedioxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-cyclohexyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-cyclohexyl-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

5 (1R)-1,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-furanyl])ethyl-2-pyrrolidinecarboxylate,

10 3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thienyl])ethyl-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thiazolyl])ethyl-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-phenyl)ethyl-2-pyrrolidinecarboxylate,

15 3-(2,5-dimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(2,5-dimethoxyphenyl)-1-prop-2-(E)-enyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

20 2-(3,4,5-trimethoxyphenyl)-1-ethyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(2-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

25 3-(4-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

5 3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

10 3,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-N-([2-thienyl]glyoxyl)pyrrolidinecarboxylate,

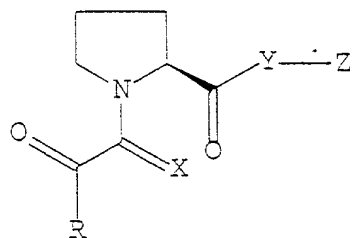
15 3,3-Diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxobutyl)-2-pyrrolidinecarboxylate,

3,3-Diphenyl-1-propyl (2S)-1-cyclohexylglyoxyl-2-pyrrolidinecarboxylate,

20 3,3-Diphenyl-1-propyl (2S)-1-(2-thienyl)glyoxyl-2-pyrrolidinecarboxylate) and pharmaceutically acceptable salts, hydrates, and mixtures thereof.

25 5. A method of promoting hair germination which comprises: administering to an animal an effective amount of a non-immunosuppressive pyrrolidine carboxylate compound.

6. The method of claim 5 wherein the pyrrolidine carboxylate is a compound of the formula:



I

wherein

5 R_1 is selected from the group consisting of a C_1 - C_8 straight or branched chain alkyl or alkenyl group optionally substituted with C_3 - C_8 cycloalkyl, C_3 or C_5 cycloalkyl, C_5 - C_8 cycloalkenyl, Ar_1 , where said alkyl, alkenyl, cycloalkyl or cycloalkenyl groups may be optionally substituted with C_1 - C_4 alkyl, C_1 - C_4 alkenyl, or hydroxy, where Ar_1 is selected from the group consisting of 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-,3-,4-pyridyl, and phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C^1 - C_8 straight or branched alkyl or alkenyl, C_1 - C_4 alkoxy or C_1 - C_4 alkenyloxy, phenoxy, benzyloxy, and amino:

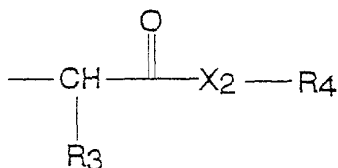
20 X is selected from the group consisting of oxygen, sulfur, methylene (CH_2), or H_2 ;

Y is selected from the group consisting of oxygen or NR_2 , where R_2 is hydrogen or C^1 - C_8 alkyl; and

Z is selected from the group consisting of C_2 - C_8 straight

or branched chain alkyl or alkenyl,

wherein the alkyl chain is substituted in one or more positions with Ar₁ as defined above, C₁-C₈ cycloalkyl, cycloalkyl connected by a C₁-C₈ straight or unbranched alkyl or alkenyl chain, and Ar₂ is selected from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, and phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C₁-C₈ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino; Z may also be the fragment:



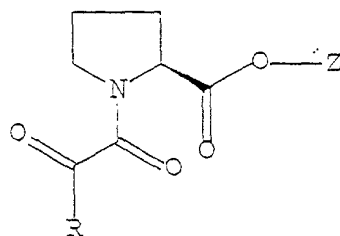
wherein

R₃ is a C₁-C₈ straight or branched alkyl, C₁-C₈ optionally substituted with C₁-C₈ cycloalkyl, or Ar₁ as defined above, and unsubstituted Ar₁;

X₂ is O or NR₅, where R₅ is selected from the group consisting of hydrogen, C₁-C₈ straight or branched alkyl and alkenyl;

R₄ is selected from the group consisting of phenyl, benzyl, C₁-C₈ straight or branched alkyl or alkenyl, and C₁-C₈ straight or branched alkyl or alkenyl substituted with phenyl; or pharmaceutically acceptable salts or hydrates thereof.

7. The method of claim 5 wherein the pyrrolidine carboxylate is a compound of the formula:



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wherein

5 R_1 is a C_1 - C_6 straight or branched chain alkyl or alkenyl group optionally substituted with C_3 - C_6 cycloalkyl, C_3 or C_5 cycloalkyl, C_3 - C_6 cycloalkenyl, or Ar_1 , where said alkyl, alkenyl, cycloalkyl or cycloalkenyl groups may be optionally substituted with C_1 - C_4 alkyl, C_1 - C_4 alkenyl, or hydroxy, and where Ar_1 is selected from the group consisting of 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C_1 - C_6 straight or branched alkyl or alkenyl, C_1 - C_4 alkoxy or C_1 - C_4 alkenyloxy, phenoxy, benzyloxy, and amino;

15 Z is a C_2 - C_6 straight or branched chain alkyl or alkenyl, wherein the alkyl chain is substituted in one or more positions with Ar_1 as defined above, C_3 - C_6 cycloalkyl, cycloalkyl connected by a C_1 - C_6 straight or unbranched alkyl or alkenyl chain, (or Ar_2 where Ar_2 is selected

from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino; or pharmaceutically acceptable salts or hydrates thereof.

8. The method of claim 5 wherein the pyrrolidine carboxylate is selected from the group consisting of:

3-phenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3,4,5-trimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3,4,5-trimethoxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(4,5-methylenedioxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(4,5-methylenedioxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-cyclohexyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-cyclohexyl-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

(1R)-1,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-

dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-furanyl])ethyl-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thienyl])ethyl-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thiazolyl])ethyl-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-phenyl)ethyl-2-pyrrolidinecarboxylate,

3-(2,5-dimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(2,5-dimethoxyphenyl)-1-prop-2-(E)-enyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

2-(3,4,5-trimethoxyphenyl)-1-ethyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(2-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(4-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-

dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-N-([2-thienyl]glyoxyl)pyrrolidinecarboxylate,

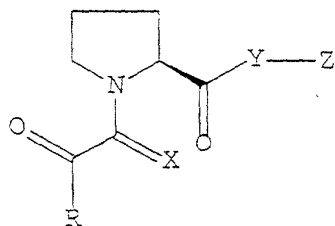
3,3-Diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxobutyl)-2-pyrrolidinecarboxylate,

3,3-Diphenyl-1-propyl (2S)-1-cyclohexylglyoxyl-2-pyrrolidinecarboxylate,

3,3-Diphenyl-1-propyl (2S)-1-(2-thienyl)glyoxyl-2-pyrrolidinecarboxylate, and pharmaceutically acceptable salts, hydrates, or mixtures thereof.

9. A method of preventing hair loss which comprises: administering to an animal an effective amount of a non-immunosuppressive pyrrolidine carboxylate compound.

10. The method of claim 9 wherein the pyrrolidine carboxylate is a compound of the formula:



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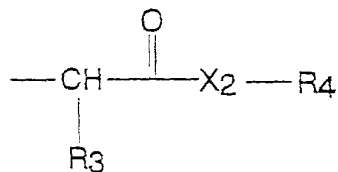
wherein

R₁ is selected from the group consisting of a C₁-C₆ straight or branched chain alkyl or alkenyl group optionally substituted with C₃-C₆ cycloalkyl, C₃ or C₅ cycloalkyl, C₃-C₆ cycloalkenyl, Ar₁, where said alkyl, alkenyl, cycloalkyl or cycloalkenyl groups may be optionally substituted with C₁-C₄ alkyl, C₁-C₄ alkenyl, or hydroxy, where Ar₁ is selected from the group consisting of 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, and phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C¹-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino:

- X is selected from the group consisting of oxygen, sulfur, methylene (CH₂), or H₂;
- Y is selected from the group consisting of oxygen or NR₂, where R₂ is hydrogen or C¹-C₆ alkyl; and
- Z is selected from the group consisting of C₂-C₆ straight or branched chain alkyl or alkenyl,

wherein the alkyl chain is substituted in one or more positions with Ar₁ as defined above, C₃-C₆ cycloalkyl, cycloalkyl connected by a C₁-C₆ straight or unbranched alkyl or alkenyl chain, and Ar₂ is selected from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, and phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro,

trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino; Z may also be the fragment:



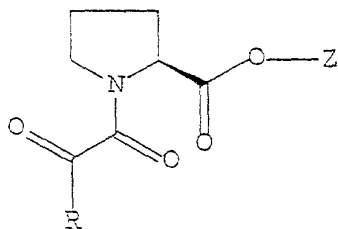
5 wherein

R₃ is a C₁-C₆ straight or branched alkyl, optionally substituted with C₁-C₆ cycloalkyl, or Ar₁ as defined above, and unsubstituted Ar₁;

X₂ is O or NR₅, where R₅ is selected from the group consisting of hydrogen, C₁-C₆ straight or branched alkyl ^{or} and alkenyl;

R₄ is selected from the group consisting of phenyl, benzyl, C₁-C₆ straight or branched alkyl or alkenyl, and C₁-C₆ straight or branched alkyl or alkenyl substituted with phenyl; or pharmaceutically acceptable salts or hydrates thereof.

11. The method of claim 9 wherein the pyrrolidine carboxylate is a compound of the formula:



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R₁ is a C₁-C₆ straight or branched chain alkyl or alkenyl group optionally substituted with C₃-C₆ cycloalkyl, C₃ or C₅ cycloalkyl, C₅-C₆ cycloalkenyl, or Ar₁, where said alkyl, alkenyl, cycloalkyl or cycloalkenyl groups may be optionally substituted with C₁-C₄ alkyl, C₁-C₄ alkenyl, or hydroxy, and where Ar₁ is selected from the group consisting of 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino;

Z is a C₂-C₆ straight or branched chain alkyl or alkenyl, wherein the ~~alkyl~~ ^{cyclo} chain is substituted in one or more positions with Ar₁ as defined above, C₃-C₆ cycloalkyl, cycloalkyl connected by a C₁-C₆ straight or unbranched alkyl or alkenyl chain, or Ar₂ where Ar₂ is selected from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino; or pharmaceutically acceptable salts or hydrates thereof.

12. The method of claim 9 wherein the pyrrolidine carboxylate is selected from the group consisting of:

3-phenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

5 3-phenyl-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3,4,5-trimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

10 3-(3,4,5-trimethoxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(4,5-methylenedioxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(4,5-methylenedioxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

15 3-cyclohexyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-cyclohexyl-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

20 (1R)-1,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-furanyl])ethyl-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thienyl])ethyl-2-pyrrolidinecarboxylate,

25 3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thiazolyl])ethyl-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-phenyl)ethyl-2-pyrrolidinecarboxylate,

3-(2,5-dimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,
 3-(2,5-dimethoxyphenyl)-1-prop-2-(E)-enyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,
 5 2-(3,4,5-trimethoxyphenyl)-1-ethyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,
 3-(3-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,
 3-(2-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,
 10 3-(4-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,
 3-phenyl-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,
 15 3-phenyl-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,
 3-phenyl-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,
 3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,
 20 3-(3-Pyridyl)-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,
 3,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,
 25 3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,
 3-(3-Pyridyl)-1-propyl (2S)-N-([2-thienyl]glyoxyl)pyrrolidinecarboxylate,

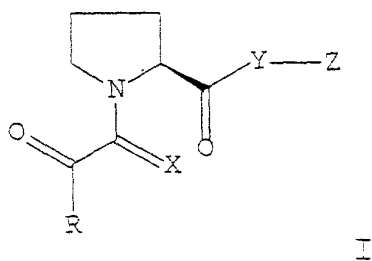
3,3-Diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxobutyl)-2-pyrrolidinecarboxylate,

3,3-Diphenyl-1-propyl (2S)-1-cyclohexylglyoxyl-2-pyrrolidinecarboxylate,

5 3,3-Diphenyl-1-propyl (2S)-1-(2-thienyl)glyoxyl-2-pyrrolidinecarboxylate, or pharmaceutically acceptable salts, hydrates, and mixtures thereof.

Supergans 13. A method of treating alopecia which comprises:
administering to an animal an effective amount of a non-
10 immunosuppressive pyrrolidine carboxylate compound.

View 13 14. The method of claim 13 wherein the pyrrolidine carboxylate is a compound of the formula:



wherein

15 R_1 is selected from the group consisting of a C_1 - C_6 straight or branched chain alkyl or alkenyl group optionally substituted with C_3 - C_6 cycloalkyl, C_3 or C_5 cycloalkyl, C_5 - C_6 cycloalkenyl, Ar_1 , where said alkyl, alkenyl, cycloalkyl or cycloalkenyl groups may be optionally substituted with C_1 - C_6
20 alkyl, C_1 - C_6 alkenyl, or hydroxy, where Ar_1 is selected from the group consisting of 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, and phenyl,

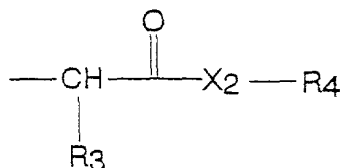
having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C¹-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino:

X is selected from the group consisting of oxygen, sulphur, methylene (CH₂), or H₂;

Y is selected from the group consisting of oxygen or NR₂, where R₂ is hydrogen or C¹-C₆ alkyl; and

Z is selected from the group consisting of C₂-C₆ straight or branched chain alkyl or alkenyl,

wherein the alkyl chain is substituted in one or more positions with Ar₁ as defined above, C₃-C₈ cycloalkyl, cycloalkyl connected by a C₁-C₆ straight or unbranched alkyl or alkenyl chain, and Ar₂ is selected from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, and phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino; Z may also be the fragment:



wherein

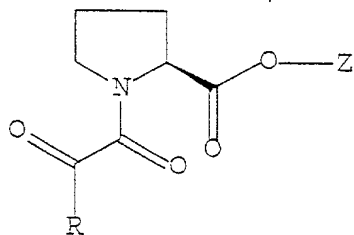
R₃ is a C₁-C₆ straight or branched alkyl #₁-C₆

optionally substituted with C₃-C₈ cycloalkyl, or Ar₁ as defined above, and unsubstituted Ar₁;

X₂ is O or NR₅, where R₅ is selected from the group consisting of hydrogen, C₁-C₈ straight or branched alkyl and alkenyl;

R₄ is selected from the group consisting of phenyl, benzyl, C₁-C₈ straight or branched alkyl or alkenyl, and C₁-C₈ straight or branched alkyl or alkenyl substituted with phenyl; or pharmaceutically acceptable salts or hydrates thereof.

15. The method of claim 13 wherein the pyrrolidine carboxylate is a compound of the formula:



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wherein

R₁ is a C₁-C₈ straight or branched chain alkyl or alkenyl group optionally substituted with C₃-C₈ cycloalkyl, C₃ or C₅ cycloalkyl, C₅-C₈ cycloalkenyl, or Ar₁, where said alkyl, alkenyl, cycloalkyl or cycloalkenyl groups may be optionally substituted with C₁-C₄ alkyl, C₁-C₄ alkenyl, or hydroxy, and where Ar₁ is selected from the group consisting of 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl,

having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino;

Z is a C₂-C₆ straight or branched chain alkyl or alkenyl, wherein the alkyl chain is substituted in one or more positions with Ar₁ as defined above, C₃-C₆ cycloalkyl, cycloalkyl connected by a C₁-C₆ straight or unbranched alkyl or alkenyl chain, or Ar₂ where Ar₂ is selected from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino; or pharmaceutically acceptable salts or hydrates thereof.

16. The method of claim 13 wherein the pyrrolidine carboxylate compound is selected from the group consisting of:

3-phenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-prop-2-(E)-enyl (2S)-1-(3,3,-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3,4,5-trimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3,4,5-trimethoxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-

dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,
 3-(4,5-methylenedioxyphenyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-
 dioxopentyl)-2-pyrrolidinecarboxylate,
 3-(4,5-methylenedioxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-
 5 dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,
 3-cyclohexyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-
 pyrrolidinecarboxylate,
 3-cyclohexyl-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-
 dioxopentyl)-2-pyrrolidinecarboxylate,
 10 (1R)-1,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-
 dioxopentyl)-2-pyrrolidinecarboxylate,
 3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-furanyl])ethyl-2-
 pyrrolidinecarboxylate,
 3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thienyl])ethyl-2-
 15 pyrrolidinecarboxylate,
 3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thiazolyl])ethyl-2-
 pyrrolidinecarboxylate,
 3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2,phenyl)ethyl-2-
 pyrrolidinecarboxylate,
 20 3-(2,5-dimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-
 dioxopentyl)-2-pyrrolidinecarboxylate,
 3-(2,5-dimethoxyphenyl)-1-prop-2-(E)-enyl(2S)-1-(3,3-dimethyl-
 1,2-dioxopentyl)-2-pyrrolidinecarboxylate,
 2- (3,4,5-trimethoxyphenyl)-1-ethyl (2S)-1-(3,3-dimethyl-1,2-
 25 dioxopentyl)-2-pyrrolidinecarboxylate,
 3-(3-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-
 pyrrolidinecarboxylate,
 3-(2-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-

pyrrolidinecarboxylate,

3-(4-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-N-([2-thienyl]glyoxyl)pyrrolidinecarboxylate,

3,3-Diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxobutyl)-2-pyrrolidinecarboxylate,

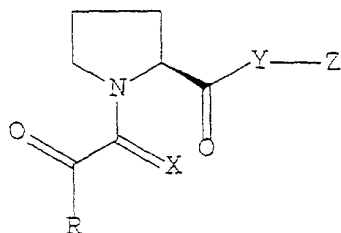
3,3-Diphenyl-1-propyl (2S)-1-cyclohexylglyoxyl-2-pyrrolidinecarboxylate,

3,3-Diphenyl-1-propyl (2S)-1-(2-thienyl)glyoxyl-2-pyrrolidinecarboxylate, and pharmaceutically acceptable salts, hydrates, and mixtures thereof.

17. A method of treating hair loss which comprises:
administering to an animal an effective amount of a non-

immunosuppressive pyrrolidine carboxylate compound.

13. The method of claim 17 wherein the pyrrolidine carboxylate is a compound of the formula:



5 wherein

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R_1 is selected from the group consisting of a C_1 - C_6 straight or branched chain alkyl or alkenyl group optionally substituted with C_3 - C_6 cycloalkyl, C_3 or C_5 cycloalkyl, C_5 - C_7 cycloalkenyl, Ar_1 , where said alkyl, alkenyl, cycloalkyl or cycloalkenyl groups may be optionally substituted with C_1 - C_4 alkyl, C_1 - C_4 alkenyl, or hydroxy, where Ar_1 is selected from the group consisting of 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, and phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C^1 - C_6 straight or branched alkyl or alkenyl, C_1 - C_4 alkoxy or C_1 - C_4 alkenyloxy, phenoxy, benzyloxy, and amino:

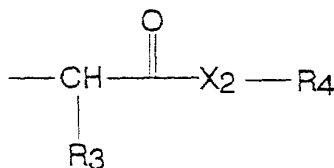
20

X is selected from the group consisting of oxygen, sulphur, methylene (CH_2), or H_2 ;

Y is selected from the group consisting of oxygen or NR_2 , where R_2 is hydrogen or C^1 - C_6 alkyl; and

Z is selected from the group consisting of C₁-C₆ straight or branched chain alkyl or alkenyl,

wherein the alkyl chain is substituted in one or more positions with Ar₁ as defined above, C₁-C₆ cycloalkyl, cycloalkyl connected by a C₁-C₆ straight or unbranched alkyl or alkenyl chain, and Ar₂ is selected from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, and phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino; Z may also be the fragment:



wherein

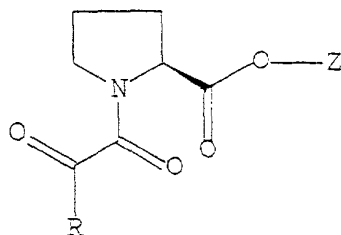
R₃ is a C₁-C₆ straight or branched alkyl optionally substituted with C₁-C₆ cycloalkyl, or Ar₁ as defined above, and unsubstituted Ar₁;

X₂ is O or NR₅, where R₅ is selected from the group consisting of hydrogen, C₁-C₆ straight or branched alkyl and alkenyl;

R₄ is selected from the group consisting of phenyl, benzyl, C₁-C₆ straight or branched alkyl or alkenyl, and C₁-C₆ straight or branched alkyl or alkenyl substituted with phenyl; or pharmaceutically

acceptable salts or hydrates thereof.

claim 14 19. The method of claim 17 wherein the pyrrolidine carboxylate is a compound of the formula:



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5 wherein

10 *11* *12* *13* *14* *15* *16* *17* *18* *19* *20* *21* *22* *23* *24* *25* *26* *27* *28* *29* *30* *31* *32* *33* *34* *35* *36* *37* *38* *39* *40* *41* *42* *43* *44* *45* *46* *47* *48* *49* *50* *51* *52* *53* *54* *55* *56* *57* *58* *59* *60* *61* *62* *63* *64* *65* *66* *67* *68* *69* *70* *71* *72* *73* *74* *75* *76* *77* *78* *79* *80* *81* *82* *83* *84* *85* *86* *87* *88* *89* *90* *91* *92* *93* *94* *95* *96* *97* *98* *99* *100* *101* *102* *103* *104* *105* *106* *107* *108* *109* *110* *111* *112* *113* *114* *115* *116* *117* *118* *119* *120* *121* *122* *123* *124* *125* *126* *127* *128* *129* *130* *131* *132* *133* *134* *135* *136* *137* *138* *139* *140* *141* *142* *143* *144* *145* *146* *147* *148* *149* *150* *151* *152* *153* *154* *155* *156* *157* *158* *159* *160* *161* *162* *163* *164* *165* *166* *167* *168* *169* *170* *171* *172* *173* *174* *175* *176* *177* *178* *179* *180* *181* *182* *183* *184* *185* *186* *187* *188* *189* *190* *191* *192* *193* *194* *195* *196* *197* *198* *199* *200* *201* *202* *203* *204* *205* *206* *207* *208* *209* *210* *211* *212* *213* *214* *215* *216* *217* *218* *219* *220* *221* *222* *223* *224* *225* *226* *227* *228* *229* *230* *231* *232* *233* *234* *235* *236* *237* *238* *239* *240* *241* *242* *243* *244* *245* *246* *247* *248* *249* *250* *251* *252* *253* *254* *255* *256* *257* *258* *259* *260* *261* *262* *263* *264* *265* *266* *267* *268* *269* *270* *271* *272* *273* *274* *275* *276* *277* *278* *279* *280* *281* *282* *283* *284* *285* *286* *287* *288* *289* *290* *291* *292* *293* *294* *295* *296* *297* *298* *299* *300* *301* *302* *303* *304* *305* *306* *307* *308* *309* *310* *311* *312* *313* *314* *315* *316* *317* *318* *319* *320* *321* *322* *323* *324* *325* *326* *327* *328* *329* *330* *331* *332* *333* *334* *335* *336* *337* *338* *339* *340* *341* *342* *343* *344* *345* *346* *347* *348* *349* *350* *351* *352* *353* *354* *355* *356* *357* *358* *359* *360* *361* *362* *363* *364* *365* *366* *367* *368* *369* *370* *371* *372* *373* *374* *375* *376* *377* *378* *379* *380* *381* *382* *383* *384* *385* *386* *387* *388* *389* *390* *391* *392* *393* *394* *395* *396* *397* *398* *399* *400* *401* *402* *403* *404* *405* *406* *407* *408* *409* *410* *411* *412* *413* *414* *415* *416* *417* *418* *419* *420* *421* *422* *423* *424* *425* *426* *427* *428* *429* *430* *431* *432* *433* *434* *435* *436* *437* *438* *439* *440* *441* *442* *443* *444* *445* *446* *447* *448* *449* *450* *451* *452* *453* *454* *455* *456* *457* *458* *459* *460* *461* *462* *463* *464* *465* *466* *467* *468* *469* *470* *471* *472* *473* *474* *475* *476* *477* *478* *479* *480* *481* *482* *483* *484* *485* *486* *487* *488* *489* *490* *491* *492* *493* *494* *495* *496* *497* *498* *499* *500* *501* *502* *503* *504* *505* *506* *507* *508* *509* *510* *511* *512* *513* *514* *515* *516* *517* *518* *519* *520* *521* *522* *523* 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*690* *691* *692* *693* *694* *695* *696* *697* *698* *699* *700* *701* *702* *703* *704* *705* *706* *707* *708* *709* *710* *711* *712* *713* *714* *715* *716* *717* *718* *719* *720* *721* *722* *723* *724* *725* *726* *727* *728* *729* *730* *731* *732* *733* *734* *735* *736* *737* *738* *739* *740* *741* *742* *743* *744* *745* *746* *747* *748* *749* *750* *751* *752* *753* *754* *755* *756* *757* *758* *759* *760* *761* *762* *763* *764* *765* *766* *767* *768* *769* *770* *771* *772* *773* *774* *775* *776* *777* *778* *779* *780* *781* *782* *783* *784* *785* *786* *787* *788* *789* *790* *791* *792* *793* *794* *795* *796* *797* *798* *799* *800* *801* *802* *803* *804* *805* *806* *807* *808* *809* *810* *811* *812* *813* *814* *815* *816* *817* *818* *819* *820* *821* *822* *823* *824* *825* *826* *827* *828* *829* *830* *831* *832* *833* *834* *835* *836* *837* *838* *839* *840* *841* *842* *843* *844* *845* *846* *847* *848* *849* *850* *851* *852* *853* *854* *855* *856* *857* *858* *859* *860* *861* *862* *863* *864* *865* *866* *867* *868* *869* *870* *871* *872* *873* *874* *875* *876* *877* *878* *879* *880* *881* *882* *883* *884* *885* *886* *887* *888* *889* *890* *891* *892* *893* *894* *895* *896* *897* *898* *899* *900* *901* *902* *903* *904* *905* *906* *907* *908* *909* *910* *911* *912* *913* *914* *915* *916* *917* *918* *919* *920* *921* *922* *923* *924* *925* *926* *927* *928* *929* *930* *931* *932* *933* *934* *935* *936* *937* *938* *939* *940* *941* *942* *943* *944* *945* *946* *947* *948* *949* *950* *951* *952* *953* *954* *955* *956* *957* *958* *959* *960* *961* *962* *963* *964* *965* *966* *967* *968* *969* *970* *971* *972* *973* *974* *975* *976* *977* *978* *979* *980* *981* *982* *983* *984* *985* *986* *987* *988* *989* *990* *991* *992* *993* *994* *995* *996* *997* *998* *999* *1000* *1001* *1002* *1003* *1004* *1005* *1006* *1007* *1008* *1009* *1010* *1011* *1012* *1013* *1014* *1015* *1016* *1017* *1018* *1019* *1020* *1021* *1022* *1023* *1024* *1025* *1026* *1027* *1028* *1029* *1030* *1031* *1032* *1033* *1034* *1035* *1036* *1037* *1038* *1039* *1040* *1041* *1042* *1043* *1044* *1045* *1046* *1047* *1048* *1049* *1050* *1051* *1052* *1053* *1054* *1055* *1056* *1057* *1058* *1059* *1060* *1061* *1062* *1063* *1064* *1065* *1066* *1067* *1068* *1069* *1070* *1071* *1072* *1073* *1074* *1075* *1076* *1077* *1078* *1079* *1080* *1081* *1082* *1083* *1084* *1085* *1086* *1087* *1088* *1089* *1090* *1091* *1092* *1093* *1094* *1095* *1096* *1097* *1098* *1099* *1100* *1101* *1102* *1103* *1104* *1105* *1106* *1107* *1108* *1109* *1110* *1111* *1112* *1113* *1114* *1115* *1116* *1117* *1118* *1119* *1120* *1121* *1122* *1123* *1124* *1125* *1126* *1127* *1128* *1129* *1130* *1131* *1132* *1133* *1134* *1135* *1136* *1137* *1138* *1139* *1140* *1141* *1142* *1143* *1144* *1145* *1146* *1147* *1148* *1149* *1150* *1151* *1152* *1153* *1154* *1155* *1156* *1157* *1158* *1159* *1160* *1161* *1162* *1163* *1164* *1165* *1166* *1167* *1168* *1169* *1170* *1171* *1172* *1173* *1174* *1175* *1176* *1177* *1178* *1179* *1180* *1181* *1182* *1183* *1184* *1185* *1186* *1187* *1188* *1189* *1190* *1191* *1192* *1193* *1194* *1195* *1196* *1197* *1198* *1199* *1200* *1201* *1202* *1203* *1204* *1205* *1206* *1207* *1208* *1209* *1210* *1211* *1212* *1213* *1214* *1215* *1216* *1217* *1218* *1219* *1220* *1221* *1222* *1223* *1224* *1225* *1226* *1227* *1228* *1229* *1230* *1231* *1232* *1233* *1234* *1235* *1236* *1237* *1238* *1239* *1240* *1241* *1242* *1243* *1244* *1245* *1246* *1247* *1248* *1249* *1250* *1251* *1252* *1253* *1254* *1255* *1256* *1257* *1258* *1259* *1260* *1261* *1262* *1263* *1264* *1265* *1266* *1267* *1268* *1269* *1270* *1271* *1272* *1273* *1274* *1275* *1276* *1277* *1278* *1279* *1280* *1281* *1282* *1283* *1284* *1285* *1286* *1287* *1288* *1289* *1290* *1291* *1292* *1293* *1294* *1295* *1296* *1297* *1298* *1299* *1300* *1301* *1302* *1303* *1304* *1305* *1306* *1307* *1308* *1309* *1310* *1311*

alkyl or alkenyl chain, or Ar₂ where Ar₂ is selected from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro trifluoromethyl, C₁-C₄ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino; or pharmaceutically acceptable salts or hydrates thereof.

20. The method of claim 17 wherein the pyrrolidine carboxylate compound is selected from the group consisting of:

3-phenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-prop-2-(E)-enyl (2S)-1-(3,3,-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3,4,5-trimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3,4,5-trimethoxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(4,5-methylenedioxyphenyl)-1-propyl(2S)-1-(3,3,dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(4,5-methylenedioxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-cyclohexyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-cyclohexyl-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

(1R)-1,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-furanyl])ethyl-2-pyrrolidinecarboxylate,

5 3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thienyl])ethyl-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thiazolyl])ethyl-2-pyrrolidinecarboxylate,

10 3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2,phenyl)ethyl-2-pyrrolidinecarboxylate,

3-(2,5-dimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(2,5-dimethoxyphenyl)-1-prop-2-(E)-enyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

15 2-(3,4,5-trimethoxyphenyl)-1-ethyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(2-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

20 3-(4-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

25 3-phenyl-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

5 3,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

10 3-(3-Pyridyl)-1-propyl (2S)-N-([2-thienyl]glyoxyl)pyrrolidinecarboxylate,

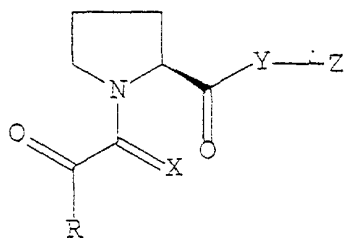
3,3-Diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxobutyl)-2-pyrrolidinecarboxylate,

3,3-Diphenyl-1-propyl (2S)-1-cyclohexylglyoxyl-2-pyrrolidinecarboxylate,

15 3,3-Diphenyl-1-propyl (2S)-1-(2-thienyl)glyoxyl-2-pyrrolidinecarboxylate, and pharmaceutically acceptable salts, hydrates, and mixtures thereof.

Sub-Group
21. A method of treating hair loss associated with cancer therapy, wherein the cancer therapy is selected from the group consisting of radiation and chemotherapy, wherein said method comprises: administering to an animal an effective amount of a non-immunosuppressive pyrrolidine carboxylate compound.

22. The method of claim 21 wherein the pyrrolidine carboxylate is a compound of the formula:



I

wherein

5 R₁ is selected from the group consisting of a C₁-C₆ straight or branched chain alkyl or alkenyl group optionally substituted with C₃-C₈ cycloalkyl, C₃ or C₅ cycloalkyl, C₅-C₇ cycloalkenyl, Ar₁, where said alkyl, alkenyl, cycloalkyl or cycloalkenyl groups may be optionally substituted with C₁-C₄ alkyl, C₁-C₄ alkenyl, or hydroxy, where Ar₁ is selected from the group consisting of 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, and phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C¹-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino:

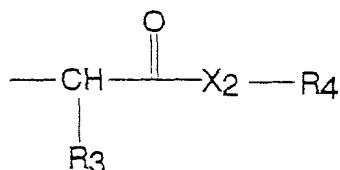
10 X is selected from the group consisting of oxygen, sulphur, methylene (CH₂), or H₂;

15 Y is selected from the group consisting of oxygen or NR₂, where R₂ is hydrogen or C¹-C₆ alkyl; and

20 Z is selected from the group consisting of C₂-C₆ straight

or branched chain alkyl or alkenyl,

wherein the alkyl chain is substituted in one or more positions with Ar₁ as defined above, C₃-C₈ cycloalkyl, cycloalkyl connected by a C₁-C₆ straight or unbranched alkyl or alkenyl chain, and Ar₂ is selected from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, and phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino; Z may also be the fragment:



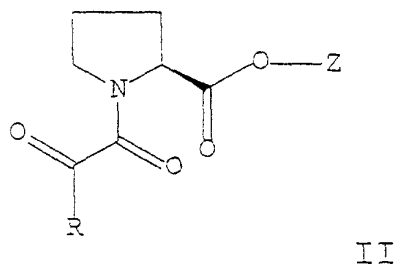
wherein

R₃ is a C₁-C₆ straight or branched alkyl optionally substituted with C₃-C₈ cycloalkyl, or Ar₁ as defined above, and unsubstituted Ar₁;

X₂ is O or NR₅, where R₅ is selected from the group consisting of hydrogen, C₁-C₆ straight or branched alkyl and alkenyl;

R₄ is selected from the group consisting of phenyl, benzyl, C₁-C₆ straight or branched alkyl or alkenyl, and C₁-C₆ straight or branched alkyl or alkenyl substituted with phenyl; or pharmaceutically acceptable salts or hydrates thereof.

23. The method of claim 21 wherein, the pyrrolidine carboxylate is a compound of the formula:



wherein

R_1 is a C_1 - C_6 straight or branched chain alkyl or alkenyl group optionally substituted with C_3 - C_6 cycloalkyl, C_3 or C_5 cycloalkyl, C_5 - C_6 cycloalkenyl, or Ar_1 , where said alkyl, alkenyl, cycloalkyl or cycloalkenyl groups may be optionally substituted with C_1 - C_4 alkyl, C_1 - C_4 alkenyl, or hydroxy, and where Ar_1 is selected from the group consisting of 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C_1 - C_6 straight or branched alkyl or alkenyl, C_1 - C_4 alkoxy or C_1 - C_4 alkenyloxy, phenoxy, benzyloxy, and amino;

Z is a C_2 - C_6 straight or branched chain alkyl or alkenyl, wherein the alkyl chain is substituted in one or more positions with Ar_1 as defined above, C_3 - C_6 cycloalkyl, cycloalkyl connected by a C_1 - C_6 straight or unbranched alkyl or alkenyl chain, or Ar_2 where Ar_2 is selected

from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents which are independently selected from the group consisting of hydrogen, halo, hydroxyl, nitro trifluoromethyl, C₁-C₆ straight or branched alkyl or alkenyl, C₁-C₄ alkoxy or C₁-C₄ alkenyloxy, phenoxy, benzyloxy, and amino; or pharmaceutically acceptable salts or hydrates thereof.

24. The method of claim 21 wherein the pyrrolidine carboxylate compound is selected from the group consisting of:

3-phenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3,4,5-trimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3,4,5-trimethoxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(4,5-methylenedioxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(4,5-methylenedioxyphenyl)-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-cyclohexyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-cyclohexyl-1-prop-2-(E)-enyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

(1R)-1,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-

dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-furanyl])ethyl-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thienyl])ethyl-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2-[2-thiazolyl])ethyl-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(1,2-dioxo-2,phenyl)ethyl-2-pyrrolidinecarboxylate,

10 3-(2,5-dimethoxyphenyl)-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(2,5-dimethoxyphenyl)-1-prop-2-(E)-enyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

15 2-(3,4,5-trimethoxyphenyl)-1-ethyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(2-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

20 3-(4-Pyridyl)-1-propyl(2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

25 3-phenyl-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-phenyl-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexylethyl-1,2-

dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-tert-butyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3,3-diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxopentyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-1-(2-cyclohexyl-1,2-dioxoethyl)-2-pyrrolidinecarboxylate,

3-(3-Pyridyl)-1-propyl (2S)-N-((2-thienyl)glyoxyl)pyrrolidinecarboxylate,

3,3-Diphenyl-1-propyl (2S)-1-(3,3-dimethyl-1,2-dioxobutyl)-2-pyrrolidinecarboxylate,

3,3-Diphenyl-1-propyl (2S)-1-cyclohexylglyoxyl-2-pyrrolidinecarboxylate,

3,3-Diphenyl-1-propyl (2S)-1-(2-thienyl)glyoxyl-2-pyrrolidinecarboxylate, and pharmaceutically acceptable salts, hydrates, and mixtures thereof.